XXVIII. *Extracts of three Letters of Sir* F. H. Eyles Stiles, *F. R. S. to* Daniel Wray, *Eſq; F. R. S. concerning ſome new Microſcopes made at* Naples, *and their Uſe in viewing the ſmalleſt Objects.*

Naples, 11th Auguſt, 1761.

Dear Sir,

Read Nov. 7, 1765.

CAptain Hood, of the Veſtal man of war, having failed from hence for Leghorn the 3d inſtant, I took the opportunity of ſending you by him a ſmall box, put into my hands by Father di Torre, containing four of his ſpherical Glaſſes for the Microſcope, which he had deſired me to tranſmit to England, as a preſent from him to the Royal Society, which he hopes will prove as acceptable as he wiſhes. The diameters of the glaſſes, and their magnifying powers, are as follows.

Glaſs.	Diameter.	Magnifying powers.
1ſt,	Near two Paris points,	640 times, and upwards, in diameter.
2d,	One Paris point,	1280
3d,	One Paris point,	1280
4th,	Half a Paris point,	2560.

The paper, which encloſes the laſt of theſe, has the following ſuperſcription.

"Igne puriſſimo generatum incredibili patientia "cucullis orichalceis incluſum globum primum & "unicum diametri puncti dimidii Pariſienſis, qui "objectorum

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“ objectorum diametrum auget 2560, inclytæ Soci-
“ etati Regiæ Anglicanæ Jo. Maria de Turre
“ D. D. D.”

I was to have accompanied this advice with ſome inſtructions for the management of the glaſſes, and alſo with ſome minutes I took lately of a few obſervations, which, at Padre di Torre's requeſt, I made with him of the globules of human blood, for the confirming of the diſcoveries in his book lately tranſmitted to you by Sir James Gray: but the Captain's departure being ſudden, and the above-mention'd papers not yet prepar'd, I thought it beſt not to loſe the opportunity I had of ſending you the glaſſes, and adviſing you immediately thereof; direct ſhipping from hence to England being ſcarce. The other papers I ſhall tranſmit you by the poſt, as ſoon as Father di Torre has furniſhed me with his directions for the management, &c.

In anticipation of the minutes I propoſe ſending you concerning the human blood, I can't help taking the opportunity of obſerving to you, that this moſt worthy Father is ſo eſteemed here for his excellent and amiable private character, that there can be no room for the leaſt ſuſpicion of the veracity of the remarks in his book; and in reſpect to his care and exactneſs in making his obſervations, I have had ſuch experience of it in ſeveral meetings he has favoured me with for the purpoſe, that I ſhould in any caſe as readily rely on his eyes as my own, and indeed with better dependence; as, by the habit of obſerving, he is enabled to pronounce immediately with certainty upon appearances, that coſt me much time and inſpection to examine and comprehend.

I entreat you will preſent my reſpects to the Royal Society; and that you will believe me to be, with great truth and eſteem,

Dear Sir,

Your moſt obedient

humble ſervant,

F. H. Eyles Stiles.

THESE glaſſes are ſo ſmall, that the diameter of the higheſt magnifier among them is but half a Paris point, which is, if I miſtake not, no more than $\frac{1}{144}$ of an inch, the point being $\frac{1}{6}$ of a line, and the line $\frac{1}{12}$ of an inch.

The great difficulty, with reſpect to theſe glaſſes, conſiſts, as Padre di Torre tells me, in the handling them, and the getting them into the little braſs ſockets, prepared for their reception. The making them in his method is ſoon done; but they muſt be ſocketed before he can examine to ſee whether the flame of his lamp, which produces them, has ſucceeded to the perfection he wiſhed; that is, whether they be perfectly ſpherical, and without flaw, ſpeck, or other accident, which they are ſo liable to, that he makes many, before he produces one to his mind: and indeed he ſets ſo little value upon them, till he has proved them by the viſion of ſome object, that if one of them, when he has made it, ſlips out of his little pincers before it has been proved, if he cannot recover it at once, he often makes a new one, rather than give himſelf the trouble to ſearch for it.

The high magnifier I have been ſpeaking of increaſes the object 2560 times in diameter; it is the firſt and only one he has ever ſucceeded to make of that high power; ſo that this preſent is a curious one.

S I R,

Read Nov. 14, 1765. AGreeable to the promiſe in mine of the 11th paſt, I encloſe you Father di Torre's inſtructions for the uſing of his glaſſes; and I ſubjoin an account of three ſeveral obſervations I made with him, at his requeſt, of the human blood. The account may be thought longer than was neceſſary; but I was willing to be as full and particular as poſſible, as I conſider'd it as a kind of appeal to my teſtimony, and as the object of it reſpected the improvement of thoſe branches of ſcience ſo intereſting to mankind, the medical and anatomical. I have put down only what I ſaw, without any regard to what he has printed. As Father di Torre's more particular view in propoſing to me to go through theſe obſervations with him, was the ſatisfying of the Royal Society of the fidelity and exactneſs of the account he has given of this ſubject in the book he lately preſented to them, I muſt deſire the favor of you to lay my account likewiſe before them; and you will alſo pleaſe to deliver to them his paper of inſtructions for the uſe of the glaſſes he has ſent them. I am, with great truth, S I R,

Your moſt obedient ſervant,

To Daniel Wray, Eſq; F. H. Eyles Stiles.

Deſcriptio Novi Microſcopii, a R. P. Di Torre *conſtructi.*

MIcroſcopium quo utor idem eſt ac illud Wilſoni, ſimplex, aptatum ſpeculo cavo ab artificibus Londinenſibus, quod deſcribitur ab Henrico Baker in *Microſcopio ad captum vulgi* cap. iv; quoniam tamen plura conducere poſſunt ad microſcopii perfectionem, illius quo utor tradam dimenſiones.

Capſulas rotundas, quibus, ope binorum cuculionum ex orichalco, claudo minimos globos, jam ad vos miſi. In his obſervandum ſedulo eſt foramen reſpiciens oculum ſpectatoris, quod & valde exiguum, & perpolitum eſſe debet, & foramen quod reſpicit objectum, quod fere ejuſdem diametri eſſe debet ac globulus; ita ut hic fere a foramine elabatur. Capſulas accuratius conficient artifices Londinenſes, ut globuli conſtituantur in centro capſulæ, & cuculiones, non ope ceræ, ſed cochleæ, firmentur.

Eſt intra corpus microſcopii alia capſula rotunda, diverſa ab ea qua utitur Wilſonus, cui imponuntur laminulæ orichalceæ cum quatuor, vel quinque foraminibus munitis duobus talcis pro objectis. Capſula hæc integra eſt, & intra ipſam filum orichalceum, quod inſtar elaſterii firmas detinet laminulas cum objectis. Supra hanc capſulam, eſt intra corpus microſcopii alium filum orichalceum ut, cum hæc capſula, ope tubi inferioris, cum cochlea ſurſum impellitur ut objectum globo appropinquetur, non excurrat lateraliter, ſed in eadem maneat directione.

Huic tubo cum cochlea, qui eſt intra corpus microſcopii, & quo objecta appropinquantur, globo adhæret in parte inferiori tubus alius, qui ope cochleæ aptatur, cujus longitudo eſt pollicis Pariſienſis cum tertia parte. Hoc utor ad excludendum lumen laterale ſuperfluum, & dirigendum lumen a ſpeculo concavo inferiori reflexum pro objectis illuminandis. Quandoque, ſi lumen a ſpeculo reflexum ſatis vividum fuerit, intra hunc tubum apto ſucceſſive diverſa diaphragmata lignea cum foraminibus $\frac{1}{3}$ vel $\frac{1}{4}$ pollicis Pariſienſis ad arcendum lumen ſuperfluum, & ut ea tantum portio luminis introducatur, quæ neceſſaria eſt ad illuſtrandum objectum, ut clare & diſtincte videatur. Ad eundem effectum parata etiam habeo plura diaphragmata ex charta craſſa, quæ ſpeculo concavo ſuperimpono.

Sub microſcopio adeſt duplex ſpeculum concavum, cujus centrum diſtat a plano ſubjecto per pollicem Pariſienſem cum dimidio, & ab objecto illuminando per pollices quatuor. Focus ſpeculi ex una parte eſt pollicum 2 cum dimidio, ex alia vero parte pollicum 2. Hoc ultimo ſpeculo utor cum lumen eſt nimis vividum. Ut lumen probe a ſpeculo reflectatur, curandum eſt ut lumen ſumatur ab aliquo pariete extra cubiculum, qui a Sole illuminatus ſit, & lumen intra ſpeculum ab alto cadere debet; ſi cadat ſub angulo fere 60 graduum, tunc lumen eſt optimum. Quandoque, ſi nullus ſit paries ante cubiculum, utor lumine reflexo cœli; ſed tunc diaphragmata adhibenda ſunt, donec objectum clare, diſtincte, & vivide oculis affulgeat. Quandoque, ſi globuli præcipue minimi ſunt aut Sol non luceat, nec diaphragmata adhibeo, nec tubum inferiorem microſcopii.

Totum artificium pro uſu recto hujus microſcopii cum globulis in eo conſtituitur, ut lumen aptum ad-

hibeatur pro illuminandis objectis, quod nec nimium, nec debile eſſe debet: ſi in alterutro pecces, omnia confundentur; agitur enim hic de globulis qui vix oculis nudis diſtinguuntur, & adeo exiguæ ſuperficiei ut radii luminis, licet exiliſſimi, ſenſibilem habeant ad ipſam ſuperficiem rationem, quod in lentibus, aut globis majoribus non evenit. Ideoque has omnes cautiones quæ adhibendæ ſunt pluſquam par erat forſan expoſui; uſus enim quæ neceſſariæ tantum ſunt facile edocebit.

An Account of ſome microſcopic Obſervations on the human Blood.

THE firſt obſervation was made July 2^{d}, 1761, with Wilſon's ſingle microſcope, conſtructed for a perpendicular inſpection, with a mirror beneath it for reflecting the light. The inſtrument was placed on a table near to a South window, but the ſun's rays were not reflected on the object; it being Father di Torre's opinion, that the ordinary day-light would ſhew the globules in a more natural ſtate. A ſmall drop of blood was included between two talks, and was changed during the obſervation, in order to give the appearance all the advantage that might ariſe from the accidental ſituation of the globules between the talks, and alſo to renew their motion; for although the blood viewed in this manner is not in a ſtate of circulation, yet, either from the vacuum formed between the talks, the attraction of their ſurfaces, or ſome other cauſe, the ſerum is ſeldom in a quiet ſtate on its being firſt included between them, and the globules that float in it move for ſome time in various directions as the current of the ſerum inclines them, or as they themſelves are more or leſs attracted by each other or by the talks, till the whole has found a ſtate of reſt.

The magnifier applied was a ſpherical glaſs, which he computed to magnify the object 512 times in diameter.

In theſe views, the globules, though they varied a little from each other in their outlines and dimenſions, appeared in general to be circular or elliptic, and of the ſize of ſwan-ſhot. Their figure as ſolids was not eaſily to be determined in ſuch an expoſition of them, but they had the appearance of oblate ſphæroids much compreſſed, although, from their free motion with the ſerum, it was manifeſt they ſuffered no preſſure from the talks; where the focus was perfect, or nearly ſo, the middle part of each globule was darker than the margin; and this difference in ſhade gave them an appearance, as if a dent or concave impreſſion had been made on their ſurfaces, which reſembled thoſe of young peas that have dimpled in the boiling. What this darkneſs next the center was owing to, will appear from the ſecond obſervation; but in this I could not judge it to ariſe from any thing but a ſinking in of the ſurface in that part, or ſome accident of the light that furniſhed ſuch an appearance.

July 9th, a ſecond obſervation was made with the ſame inſtrument, to which was applied a ſphere which magnified the object 1280 times in diameter. In this view, the variation of ſhade on the middle part of each globule from that of the margin, was ſuch as carried with it ſtrongly the appearance of a perforation. I had indeed my doubts of this on firſt examining them, becauſe, on a very ſlight alteration of the delicate focus of ſo high a magnifier, the light and dark parts would interchange, ſo that the refraction or reflection of the light might ſtill be ſuſpected to occaſion the appearance in queſtion: but continuing my view ſtedfaſtly, and taking notice of all the diverſities which a numerous collection of globules preſented, I remained at laſt thoroughly convinced that they were perforated; for, when any of the globules happened to move with the ſerum in the moſt perfect focus, which could not happen to all, in a medium of ſome little depth, I could with great clearneſs diſtinguiſh the exterior and interior circumference of the ring, of which each globule conſiſted; the interior one being bounded by a black line or ſhade next the perforation, exactly reſembling that which bounded the exterior one, and diſtinguiſhed it from the ſerum without. In ſuch globules I could alſo eaſily obſerve the ring to be articulated, the tranſverſe lines at the joints being very diſtinguiſhable. The figures of the articulations were various; in ſome they were roundiſh, ſo that the ring appeared like a bead necklace; in others, cylindrical, and of ſome length. The number of which the whole was compoſed, ſeemed uncertain, varying from two or three to ſix or ſeven; many of the rings were broke, either by ſome confinement of the talks, or by beating againſt each other, which I ſaw them continually doing; and by theſe accidents the joints of the rings were detached, and wandered about ſeparately in great numbers; and indeed they appeared ſeparable with as much eaſe as if they had been united by mere contact only. Some of the rings were broke into ſemi-circles, others into greater or leſs portions, and others again divided into their conſtituent articulations, which in ſome places floated about ſingle, and in others formed by their mutual attraction a lateral union, like the pipes of an organ. I muſt obſerve alſo, that theſe ſeparated parts ſeemed to be hollow and tranſparent, and, like inflated bladders, would eaſily yield, and change their figure, ſtretching or contracting themſelves from round to oval and cylindrical, and *vice verſa*, as any lateral preſſure in crouding along with the ſerum brought a conſtraint upon them. As they floated at different levels, I obſerved many of them paſs over or under each other without interruption, and the ſame would happen alſo to the whole rings and larger portions. I remained, therefore, after repeated examinations of the globules in this ſtate, without the leaſt doubt either of their perforation or articulation; for although the articulation was not diſtinguiſhable in every globule, I think it was ſo in the greater part of them; and it is natural to imagine that the reſt were articulated likewiſe, though they might not paſs at the proper diſtance for its being diſtinguiſhed. I omitted to ſpeak of the ſize of the globules in this obſervation, nor indeed can I, from ſo various an appearance, form any judgment thereof, farther than to ſay that they appeared in general much augmented beyond their appearance on the 2d of July.

Auguſt 27th, a third obſervation was made with the ſame inſtrument of ſome blood dropped upon a ſingle talk, and view'd as it lay without any cover, ſo that there could be no compreſſion. I view'd it, whilſt the globules were ſtill in motion, with a ſphærule that magnified the diameter 1920 times; and in this view the globules appear'd ſo clearly to be hollow rings, that there was not room for the leaſt ſuſpicion of the reality of the fact from any circumſtance. The diameter of the perforation appeared much larger in proportion to the thickneſs of the circumference than it had done in the former views. The figure of the rings, where they were free, and in their natural ſtate, was circular; but where they were ſo crouded together as to compreſs one another in their paſſage, they aſſumed a variety of different figures, although they generally reſtored themſelves to a circular figure again, unleſs broken by the compreſſion which frequently happened, and then the broken parts floated ſeparately; or, if they opened at a ſingle joint only, the whole of the ring would float along, varying its figure occaſionally from that of a portion of a circle, which it would firſt aſſume, to a ſtraight line, an undulated one, or ſome other accidental incurvature. The articulation was viſible in ſeveral of the perfect rings, but for the moſt part it was not to be diſtinguiſhed, tho' even in theſe, from their breaking ſo eaſily, it was not to be doubted but that they conſiſted of the ſame detached members or joints as thoſe in which the tranſverſe diviſions were viſible.

Upon applying afterwards magnifiers of leſs power to the ſame blood, the greater advantage of light made the rings appear ſtill more perfect and diſtinct; but as theſe were not applied till the globules had loſt their motion, and the whole drop had grown dry upon the talk, the diviſions at the joints were none of them viſible; almoſt all the globules or rings, as I muſt now call them, had, upon drying, formed themſelves into perfect circles. The moſt complete and ſatisfactory view I had of them in this dried ſtate, was with a magnifier that encreaſed the diameter 640 times; tho' the perforation was diſtinguiſhable even with one which encreaſed it only 129 times. In many places the globules had, by the drying of the whole drop, united into a cloſer body, and ſeem'd as if cemented together by a grumous ſubſtance of a blackiſh or deep red colour, which poſſeſſed and filled up all the exterior ſpaces form'd by the union of ſo many circular bodies; but the interior ſpaces or perforations of the rings were ſtill free, and for the moſt part diſtinctly viſible, ſome few places excepted, where the globules ſeem'd to have united over one another, and not only lay in too much confuſion to give room for any proper obſervation of them, but formed alſo a body too denſe to tranſmit the light. The grumous ſubſtance abovemention'd, as it extended itſelf along the exerior ſpaces, had the appearance of a ramification; and it was perhaps in ſome ſuch ſtate that the globules were view'd by Dr. Adams, whoſe glaſſes induced him to ſuſpect the truth of the common opinion, that the blood conſiſted of globular particles, and to deſcribe them rather as imitating the branches of a tree. See his Remark on Blood, in Jones's Abridgment of the Philoſophical Tranſactions, vol. IV. p. 204.

A Letter of Sir F. H. E. Styles, *F. R. S. to* Daniel Wray, *Eſquire, F. R. S. on the Sexes of Plants.*

Naples, December 29, 1761.

S I R,

Read Dec. 12, 1765.

I Encloſe you Profeſſor Cyrillo's drawings of the objects lately viewed with the microſcopes of Padre di Torre, which he deſires may be preſented with his reſpects to the Royal Society. The explanation I have annexed of the figures, will in ſome meaſure ſhew how they ſerve to confirm the remarks I ſent you on the impregnation of vegetables. However, that our reflections on this ſubject may receive a more methodical ſupport from them, I encloſe you another copy of the remarks, with numeral references to thoſe figures, that ſerve to verify the account given of the particular appearances, which I was obliged to omit in the firſt copy, as the figures had not been then ranged and numbered.

In my letter of the 16th of November, accompanying theſe remarks, ſpeaking of the claſs Diœcia, I ſaid, that there muſt in this claſs be ſome original difference, either between the corpuſcles which produce the male plants, and thoſe which produce the female ones, or between the reſpective ova which receive them: a further reflection ſince upon the ſubject has led me to doubt whether there is a neceſſity for ſuch ſuppoſition, there occurring to me another way of accounting for this part of the œconomy of Nature, which I not only think a more probable one, but which, if all the circumſtances to be explained are duly attended to, will, perhaps, be thought to amount to more than a conjecture. I would ſuppoſe that not only in the Diœcious plants, but in the Monœcious and Polygamious alſo, and, to ſpeak more generally, in all caſes where the male and female organs are found ſeparate, the defect is not in the flower, which I ſuppoſe to be originally inſtructed with the rudiments of the organs of both ſexes, but that it ariſes from ſome circumſtance in the plant that determines it to blow the one organ and not the other.

That the abſence of the rudiments is not to be inferred from the want of their expanſion appears plainly from the following circumſtances that fall under every one's obſervation, viz.

That plants do not produce their flowers all the year, but only at particular ſeaſons.

That many plants are ſome years before they produce their flowers, and hardly any, except annuals, blow the firſt year after they are ſown.

That ſoil, climate, pruning, and many other circumſtances, will bring plants to blow ſooner or later than they would otherwiſe do.

That culture will encreaſe the quantity of bloom, and thereby occaſion the expanſion of flowers, which would otherwiſe have remained within the wood.

Now if theſe circumſtances, which are ſimilar to thoſe of which the explanation is ſought, be ſo common, I aſk why we may not in like manner ſuppoſe, " that, whenever either the male or female organs

" are abſent, it is owing to ſome circumſtance that
" determines the ſap into other channels, and thereby
" prevents the expanſion of the part."

I ſaid this would, perhaps, be thought to amount to more than a conjecture; becauſe, beſides its probability from the circumſtances I have ſtated above, it will perfectly explain another well atteſted phænomenon in the claſs Diœcia, that is ſcarce to be accounted for on any other ſuppoſition. viz. that a male plant has, at a certain age, been found to change to a female one, and *vice verſa*, and alſo to bear flowers of both ſexes, to which I may add another which I have myſelf obſerved in the Monœcious plants, Zea and Ricinus, where I have often found ſpikes of fruit breaking out amongſt the male flowers, though they commonly come out ſeparate from them in another part of the plant.

If there be any weight in the arguments I have here uſed in ſupport of this ſuppoſition, the general concluſion will be this, that the flowers of all vegetables whatſoever are hermaphrodite in their original conſtruction, though both the organs do not appear in all caſes.

I am,

SIR,

Your moſt obedient Servant,

F. H. Eyles Stiles.

Remarks

Remarks on the Impregnation of Vegetables.

EACH grain of pollen is a veſſel filled with pulpy matter, in which are lodged a conſiderable number of ſmaller grains, which may be called the impregnating corpuſcles (Figure 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13). Theſe are not viſible with the naked eye, but may be diſtinguiſhed with glaſſes of moderate power, if the grain be tranſparent, or if the pulp be forced out by compreſſing the grain between the talks. They are round, tranſparent, and nearly of the ſame ſize in all plants. They are conveyed to the germen through the ſtyle, which is furniſhed with internal ducts for that purpoſe; and in the claſs Syngeneſia, and in the ſmall plants of other claſſes, where the ſtyle is ſlender and tranſparent, they may be diſtinguiſhed in their paſſage (Figure 19). The manner of their reception into the ſtyle depends on the diſpoſition of its ſurface: our obſervation fell chiefly on thoſe plants that have hairy ſtyles or ſtigmas; and in theſe the corpuſcles enter by means of the hairs, which are often found on the ſtyle itſelf, ſo that the ſtigma muſt not always be looked upon as the only recipient part, though it may, perhaps, be ſo in moſt inſtances. The hairs are ſo many tubes open at the extremity for the reception of the corpuſcles; they are uſually ſhaped like a thorn, or prickle, widening towards the baſe. They are each of them furniſhed with a canal, or tube, which divides itſelf at the broader part of the hair, and enters the piſtillum in two branches (Figure 17) which run on till they join the longitudinal ducts that lead to the germen (Figure 21). Theſe canals, after they enter the piſtillum, are leſs regular, branching out frequently into ſmaller ones, which, inſtead of running directly to the longitunal ducts, vary their direction, and fall into the canals that run from the hairs next adjoining, furniſhing the appearance of an irregular reticulation (Figure 22), though nevertheleſs there are commonly principal canals obſervable that run more directly towards the longitudinal ducts, and fall into them (Figure 22). The corpuſcles are admitted into the hairs in the following manner; the grains of the pollen having diſperſed themſelves about the ſtyle and ſtigma, great numbers of them find a lodgement amongſt the hairs; thoſe which fall between the hairs, or cling to the ſides of them, may be ſuppoſed to loſe their effect, which will not be thought improbable, if it be conſidered what an abundant proviſion there is of the pollen, and how large a part of it muſt neceſſarily be waſted by being carried away by the flower, or at leaſt not falling on the female organs, but there are many of the grains that fall on the points of the hairs (Figure 23), and theſe furniſh the impregnation. The grains being arrived at a ſtate of maturity before they iſſued from the antheræ, are prepared to burſt and diſcharge their contents when they fall on the hairs, and the female organ aſſiſts likewiſe in producing this effect; for ſoon after a grain has lodged itſelf, the point of the hair begins to open, and the mouth extends itſelf by degrees over the ſurface of the grain, till almoſt the whole body of the grain is drawn within the tube (Figure 23); in this ſituation, the grain ſoon yields to the compreſſion of the tube, and diſcharges its corpuſcles, which, with the aſſiſtance of the fluid parts of the pulp that enter with them, or of the juices with which the tube itſelf is furniſhed, float on till they enter the longitudinal ducts, which convey them to the germen. The grains, after thus emptying themſelves of their contents, wither and contract, and, falling off from the mouth of the tube, remain in a periſhed ſtate about the ſides of the piſtillum (Figure 19). The figure of the hair, whilſt the grain is lodged in the mouth of the tube, is remarkable; for the tube is then wideſt at the extremity, and leſſens gradually as far as the bifurcation, where it forms a narrow neck, which gives a bell-ſhaped figure to the ſuperior parts, whilſt the lower part widens again towards the baſe (Figure 23). In tranſparent ſtyles, the ducts that lead to the germen may be ſeen filled with corpuſcles, which, being ſupplied in great quantities from the hairs, paſs on through theſe ducts in regular lines ſo cloſe as to touch one another (Figure 19). In ſome inſpections, the corpuſcles were ſeen to move both in the hairs and in the principal ducts of the ſtyle, which ſhewed them to be detached ſubſtances, that could paſs freely with the current of the juices in which they floated; but their regular progreſs towards the germen was doubtleſs interrupted by the gathering of the flower, ſo that the motion obſerved could only be aſcribed to accidental attractions, which put the juices in motion between the talks; and this was evident alſo from the direction of their motion, which was caſual, and not always leading towards the germen. The number of the principal ducts that lead to the germen cannot be aſcertained; they probably vary according to the number of loculaments to be ſupplied; more than one was commonly obſervable with the corpuſcles paſſing in cloſe files through them, as has already been deſcribed. In the piſtilla of flowers in bud, no corpuſcles could be diſcovered; which is a ſtrong proof that they are received from the pollen, and deſtined for the impregnation.

Upon examining the pappus or down that crowns the ſeeds in the claſs Syngeneſia, the hairs of the pappus were found to be hollow, and filled with the ſame corpuſcles (Figure 24). How the corpuſcles are admitted into them, or for what purpoſe they are lodged there, muſt be left to further enquiry; in the mean time, it may be obſerved, that the ſituation of the pappus makes it improbable that the corpuſcles ſhould be received therein for the purpoſe of conveying them to the germen; and that therefore it is more natural to ſuppoſe, that the corpuſcles arrive there after their paſſage thro' the germen, and that the hairs of the pappus ſerve as excretory veſſels for taking off thoſe that were uſeleſs to the impregnation. This is the more probable, as the great quantity of them brought by the ducts muſt doubtleſs occaſion ſuch a ſuperfluity.

Upon examining various plants of the order Filices, of the claſs Cryptogamia, no male organs could be diſcovered. If the flowers of theſe plants be hermaphroditic, the ſtaminiferous part doubtleſs falls off as ſoon as the impregnation is over, as it does in other caſes; ſo that if the male organs are not ſought for at the preciſe time when the plant is in bloom, the ſearch muſt be a vain one. The fructification in theſe plants is for the moſt part covered with a thin membrane, which Mr. Miles calls a ſort of fungus or tubercle (Phil. Tranſ. N°. 461.) and which, at its firſt appearance, and for ſome time afterwards, ſeems to have its margin cloſely adhering to the leaf. If the antheræ lie under this cover, it is probable that the flowers do not blow till the margin has detached itſelf from the leaf, and admits the air to come under it, for the maturation and diſperſion of the pollen. This may, perhaps, point out the critical time for ſearching for the antheræ. However this may be, the antheræ and pollen are probably very minute; and as it is no eaſy taſk to make the examination of what is concealed under theſe membranes with a ſingle microſcope, to which the glaſſes we have uſed are commonly applied, we have not yet found the means of diſcovering them. The ſeed veſſels and ſeeds have been already well deſcribed and figured by Mr. Miles; however, as ſome delineations were made of them as they appeared to us, they will accompany the other drawings (Figures 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36,) and may ſerve to confirm Mr. Miles's account of them.

In the male flowers of Marchantia Polymorpha Linn. the grains of pollen were obſerved in a thick tuft of hairs, where they ſeemed rather to have lodged themſelves accidentally after their diſperſion, than to be affixed to them as they are deſcribed by Linnæus (Farina crinulo affixa. Gen. Plant.) Theſe hairs, viewed with the microſcope, had a remarkable appearance, each hair conſiſting of a double chain, and each chain being compoſed of round bodies,

placed

placed at regular diſtances from each other, and connected by a thread. The two chains are ſo cloſe to each other, that the bodies touch one another in pairs, the whole making a regular figure. After compreſſing one of theſe hairs between the talks, the two chains ſeemed to have twiſted round each other, and to exhibit an appearance ſomewhat reſembling the cable of a ſhip. Of the uſe of theſe hairs in the male flowers, we could form no conjectures. The figures of them will be found amongſt the drawing (Figures 37, 38.)

Explanation of the Figures in TAB. VIII. and TAB. IX.

N. B. The generic and ſpecific names here uſed are the Linnæan. The numbers in the column on the right hand ſhew how many times the object was magnified in diameter.

FIG. 1.	A grain of the pollen of Hibiſcus Syriacus,	512
2.	The ſame, with the impregnating corpuſcles forced out by compreſſing the talks,	512
3.	Some of the ſame corpuſcles ſeparate from the grain, and more extended in length, which was ſuppoſed to ariſe from their adheſion to one another, tho' the diviſion was not perceptible,	512

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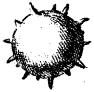
Fig. 1.



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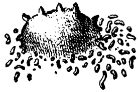

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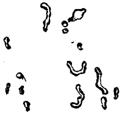

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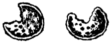

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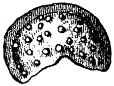

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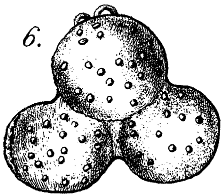

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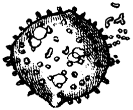

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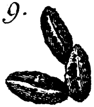

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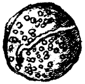

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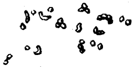

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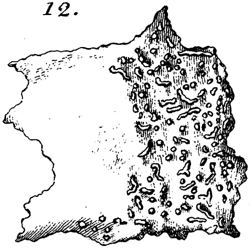

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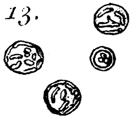

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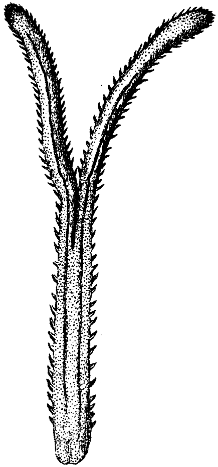

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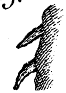

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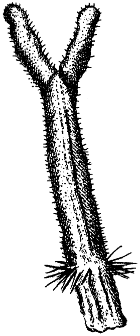

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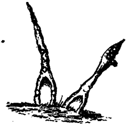

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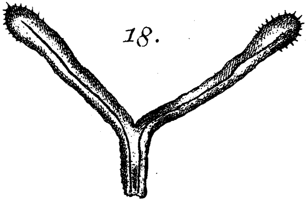

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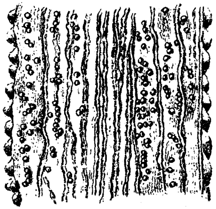

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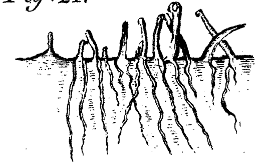
Fig. 21.



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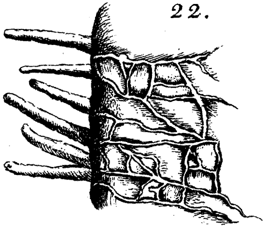

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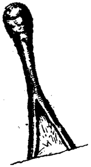

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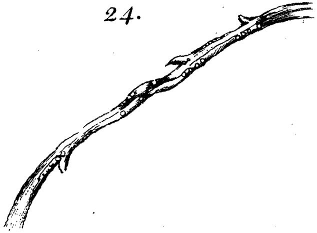

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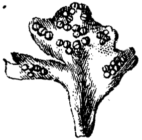

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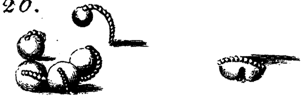

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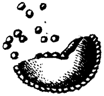

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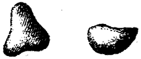

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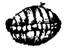

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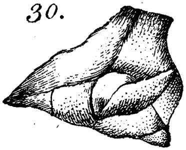

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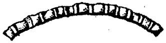

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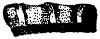

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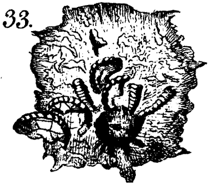

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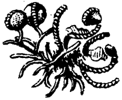

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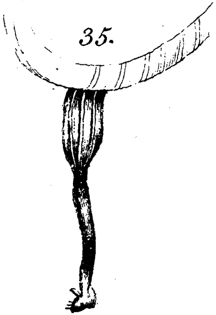

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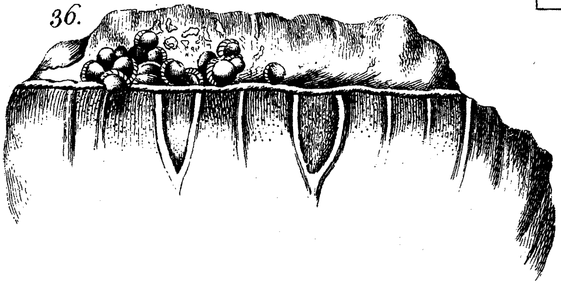

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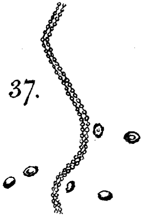

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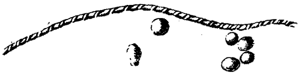

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FIG. 4.	Grains of the pollen of Mirabilis jalapa with the impregnating corpuſcles ſeen within them,	72
5.	A grain of the ſame,	512
6.	Three grains of the ſame ſticking together,	1280
7.	Corpuſcles of the ſame, viewed ſeparate,	1280
8.	A grain of the pollen of Cucumis ſativus, with the corpuſcles within it, and ſome on the outſide, that had been forced out,	192
9.	Grains of the pollen of Bignonia radicans, with the corpuſcles within them,	
10.	A grain of the ſame,	1280
11.	Corpuſcles of the ſame, view'd ſeparate,	1280
12.	A grain of the pollen of Gomphræna globoſa, compreſſed,	1280
13.	Grains of the pollen of Bryum, with the corpuſcles within them,	1280

N. B. The ſame corpuſcles were ſeen in the pollen of Atropa, Hyoſcyamus, Scilla, Scabioſa, Valeriana, Verbaſcum, and a great number of other genera; but the delineations were omitted, as the appearances were nearly alike in all.

FIG. 14.	The ſtyle and ſtigma of Leontodon taraxacum,	72
15.	Two hairs of the ſame, in which the perforation was diſtinguiſhable,	1280

FIG. 16.	The ſtigma and part of the ſtyle of Carduus criſpus,	72
17.	Two of the longer hairs of the ſame, in which the canals or tubes, with their bifurcation, are ſhewn, and the corpuſcles paſſing thro' them,	1280
18.	The ſtigma and part of the ſtyle of Conyza ſquamoſa,	72
19.	A portion of the ſtyle of the ſame, with the corpuſcles paſſing thro' its longitudinal ducts, and the emptied grains of the pollen adhering to its ſides, after having dropped from the hairs of the ſtigma.	859
20.	A perfect grain of the pollen of the ſame,	859
21.	Part of the ſide of a ſtyle of Solanum officinarum, with its hairs, and the continuation of their canals thro' the body of the ſtyle,	128
22.	Part of the ſame, in which the tranſverſe communication between the canals is ſhewn,	384
23.	A hair of the ſame, with a grain of pollen lodged within the extremity of the tube,	1280
24.	Part of a hair of the pappus that adheres to the rudiments of the ſeeds in Sonchus oleraceus, with the corpuſcles within them,	1280

Fig. 25. A leaf of Aſplenium ruta muraria, with its ſeed veſſels, which in this plant have no membrane that covers them.

26. The ſeed veſſels of the ſame, with their elaſtic rings, 42

27. A ſeed veſſel of the ſame, broke by compreſſion, with the ſeeds falling out, 128

28. Seeds of the ſame, 859

29. A ſeed veſſel of the ſame, in which the parallel ſtreaks on its exterior ſurface are ſhewn, 128

30. A ſmall portion of the capſular part of the ſeed veſſels of the ſame, on the ſurface of which there appeared ſmaller ſtreaks, which ſubdivided the parallel ones ſhewn in Fig. 31. 859

31. A portion of the ring of a ſeed veſſel of the ſame, 512

32. A ſmaller portion of the ſame ring, in which was obſerved a plane ſide at the under part, where it adhered to the capſule; upon examining the broken part at the end, the ring appeared to be ſolid.

Fig. 33.

FIG. 33.	A membrane that covered the fructification of Polypodium filix was ſeparated from the leaf, and ſhewn as it appeared upon viewing its under ſide with ſome of the ſeed veſſels adhering to it. (*a*) The broken part where it had been joined to the leaf.	
34.	Some of the ſeed veſſels of the ſame viewed ſeparate,	48
35.	The peduncle of a ſeed veſſel of the ſame ſupporting the ring,	1280
36.	Part of a leaf of Adiantum capillus veneris, ſhewing the membrane which grows from its margin, and which folds over it to cover the fructification, but had been unfolded for obſerving the under ſide and ſeed veſſels, which are here ſhewn.	
37.	Part of one of the hairs of the male flowers of Marchantia polymorpha, with ſome of the pollen,	1280
38.	The ſame compreſſed,	1280